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Black Willow

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Black willow is a tree of the Eastern United States common in wet areas that are not permanently flooded. It is a pioneer species that is commercially important in the lower Mississippi River Valley where it grows best. The wood is light in weight, soft, high in shock resistance, very stable, glues well, accepts most finishes, but is not durable under conditions favorable to decay. The medium-dark heartwood has a pleasant, pale reddish-brown color. Black willow wood is used primarily in millwork, household furniture, and containers.

Black Willow
(*Salix nigra* Marsh.)

Roger M. Krinard[1]

Distribution

Black willow is found throughout the eastern half of the United States. The northern limit of its range closely follows the 45th parallel from central Minnesota and Wisconsin east to the coast of Maine. Its eastern boundary is the Atlantic coast from Maine to Florida; its southern boundary is along the Gulf of Mexico to the mouth of the Rio Grande River. The western limit is the Rio Grande, then northward through Oklahoma, eastern Kansas, and along the Missouri River through Nebraska and Iowa to south-central Minnesota (fig. 1). There are several scattered and isolated stands throughout northern Mexico. The commercial range of black willow covers most of the Mississippi River Valley and its tributaries.

Elevations where black willow occur vary from near sea level in the South to probably less than 1,000 feet in the North and West. Length of growing season varies from approximately 120 to 300 days, with possible temperature extremes of -40 °F to 110 °F. Annual precipitation ranges from about 30 inches, north and west, to 64 inches at the southern Gulf Coast. Best development occurs at elevations of less than 500 feet where rainfall exceeds 48 inches annually and the growing season is at least 220 days long.

Throughout its range, black willow is a common tree in wet areas that are not permanently flooded. It grows near rivers and lakes where the soil is not very sandy. It is also common in swamps, sloughs, and swales, as well as on the banks of bayous, gullies, and drainage ditches.

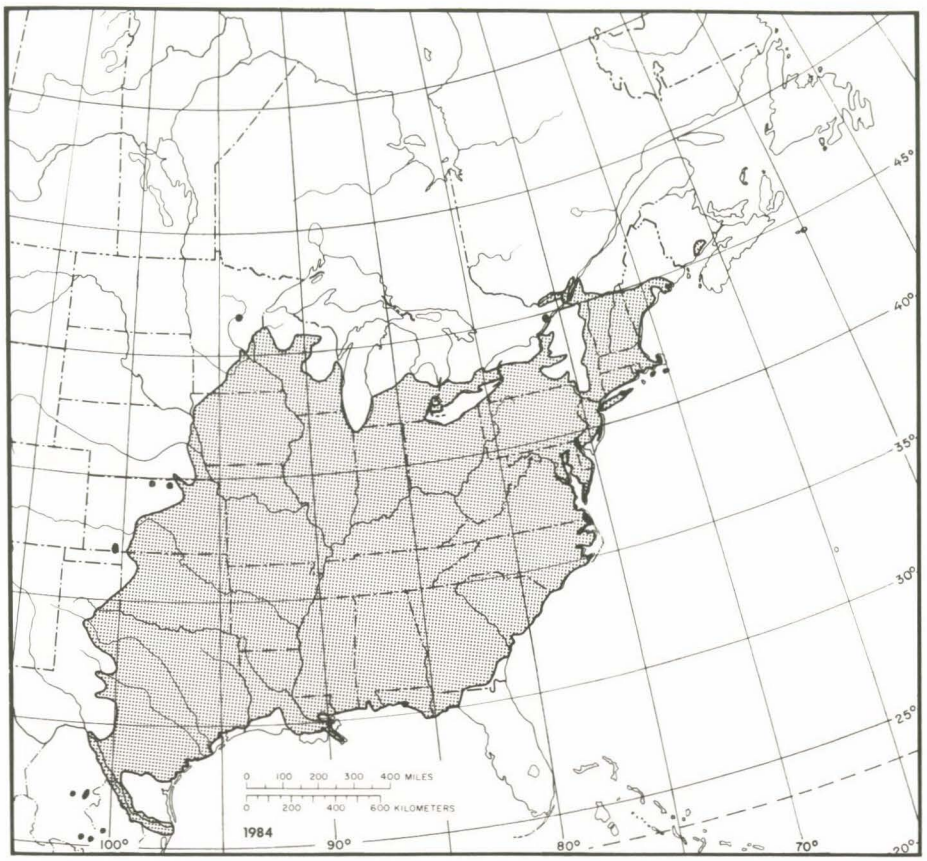

Figure 1—Natural range of black willow.

Description and Growth

Black willow belongs to the *Salicaceae* family, which is divided into two genera, *Populus* (cottonwoods and aspens) and *Salix* (willows). The generic name is derived from two Celtic words, *sal* and *lis*, which mean "near water." The species name *nigra* refers to the black bark of the mature tree.

There are approximately 300 species of willow found throughout the Northern Hemisphere, from the semitropics north to the Arctic. Over this broad area, willows vary in size from a few inches tall above the Arctic Circle in Alaska to trees over 120 feet in height along the lower Mississippi River. Of the 90 species of willow native to the United States, only the black willow is important as a sawtimber tree.

Black willow trees are either male or female. The staminate flowers of the male tree produce pollen during the early spring. Insects and occasionally wind carry pollen to the pistillate flowers of the female tree (fig. 2). The seeds are borne in a catkin composed of a number of individual capsules. Seeds within the capsules are covered with a mass of cottony fibers. When the capsules open, the fibers with the seeds attached are blown by the wind, and the seeds are often dispersed over great distances. The seeds are very small, numbering about 2 million per pound.

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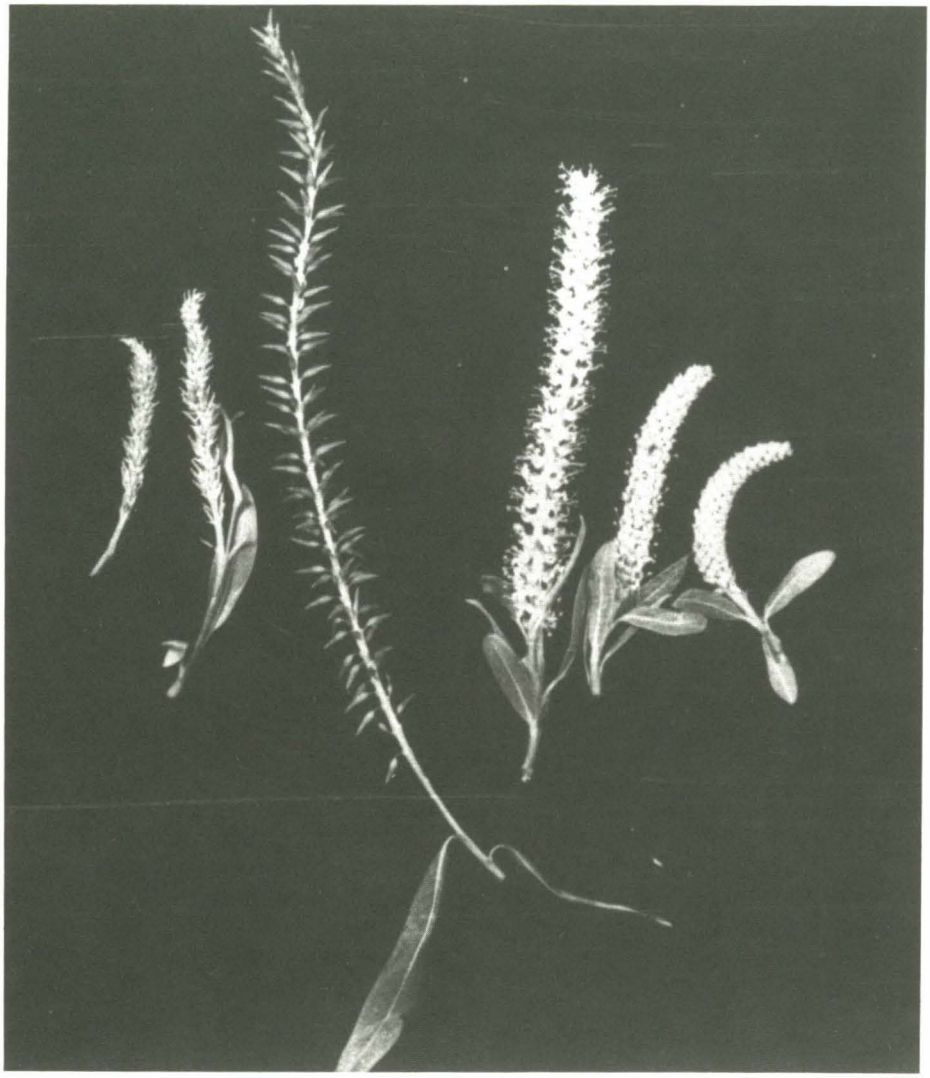

Figure 2—Black willow flowers showing three stages of development. Female flowers (left to center); male flowers (right to center).

Willow seeds germinate within a few hours. Initial growth is rapid. After one growing season the seedlings may be 5 to 7 feet tall. Natural stands in the lower Mississippi Valley can have trees that average 50 feet tall and 5.6 inches in diameter in 10 years, 73 feet and 7.5 inches in 20 years, and 101 feet and 19.4 inches in 40 years. Maximum heights are about 140 feet, and largest diameters about 48 inches. Unmanaged black willow stands in the lower Mississippi Valley at age 25 often contain 50 cords of pulpwood per acre.

This rapid growth is exceeded only by cottonwood. At age 35, stand volumes have been estimated to contain 28,300 board feet of sawtimber or 66 cords of pulpwood per acre. When the trees are 50 years old, 40,000 board feet of sawtimber per acre may be available for harvest. Black willow usually begins to die by age 55. The oldest known black willow that was free from decay was 70 years old.

The leaves of black willow are 3 to 6 inches long and 3/8 to 3/4 inch wide, lanceolate in shape, with finely serrated edges (fig. 3). The bark is dark brown or nearly black, and on older trees it is broken into flaky ridges.

The roots must have a continuous supply of water during the growing season. Black willow is one of the more tolerant tree species in its ability to withstand long periods of inundation, but flooding conditions involving stagnant, muddy water have been known to kill a tree within 2 years. Even too much flowing water during the growing season can be detrimental when the trees are young.

Along streams where sediment is deposited, willow trees are often the first major vegetation to become established. They help to elevate the land by trapping more sediment. Often as much as 20 feet of the lower part of the tree will be buried in sediment, but roots will continue to develop along the entire covered stem.

Black willow does not tolerate shade; it requires abundant sunlight for survival as well as for good growth and development. As the stands mature, more shade-tolerant species become established, and gradually the willow is replaced.

Black willow in the South often grows in pure stands. Its chief associate along the Mississippi River is cottonwood (*Populus deltoides*), with willow favored on sites which receive lengthy flooding during the growing season. It is also found in openings in baldcypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), and swamp tupelo (*Nyssa sylvatica* var. *biflora*) stands and is occasionally found scattered within overcup oak (*Quercus lyrata*) and water hickory (*Carya aquatica*) stands. Common associates are black spruce (*Picea mariana*) in the North and river birch (*Betula nigra*) and sycamore (*Platanus occidentalis*) in the Central States.

Figure 3—Black willow leaves.

Common Names

Black willow is the preferred common name; however, it is often simply called willow. In the South it may be referred to as swamp willow.

Supply

Black willow is of greatest commercial importance in the alluvial bottom lands along and close to the lower Mississippi and its main tributaries. Willow sawtimber comprises about 10 percent of the board foot volume on these sites and occupies about 200,000 acres. River control practices have restricted the establishment of new willow stands.

The largest volume of willow sawtimber occurs in Louisiana, followed by Arkansas and Mississippi. Forest survey figures from the mid- to late-1970's show the Mississippi River Delta areas of these three States with a combined standing volume of 2.04 billion board feet, or 95 percent of all the willow volume in these States. In the Delta areas volumes increased 1.5 percent in 20 years, while overall volumes for the three States decreased 6.5 percent. Adding Missouri, Tennessee, and Texas survey volumes from the 1970's to the other three States increases the total volume of standing black willow sawtimber to 2.59 billion board feet. Another 0.2 to 0.3 billion board feet may be in other States in the Midwest (Kansas, Iowa, Wisconsin, Illinois, and Indiana).

Production

Around 1900, black willow was cut in limited quantities to be used as lumber in local communities and was known as brown or black cottonwood. By 1909 production had reached 1.25 million board feet. Annual willow lumber production levels have varied considerably for a number of years, but have probably averaged between 20 and 40 million board feet. The estimated 1970 production for the United States was 25 to 30 million board feet. Willow wood used in manufacturing industries was 20.93 million board feet in 1961 and 34.33 million board feet in 1965. Furniture and fixtures used 27 percent of the willow volume; lumber and wood products used 54 percent; caskets, 16 percent; and other uses, 3 percent.

Black willow veneer log production for the Midsouth in 1972 was 1.858 million board feet, with 50 percent of the volume harvested in Arkansas and 40 percent in Mississippi. Mississippi processed 62 percent of the willow volume. Pulpwood production in the Mississippi Valley was 69,000 cords annually from 1968 to 1970.

Since black willow occurs on moist sites, damage by fire is rare. However, even a very light fire will kill small trees and wound the larger ones, thereby providing an entrance for decay fungi. Insect holes, broken tops, and branch stubs are other major entrance points. Loss from decay fungi increases as stands mature, but total loss is small, even in older stands.

Cottonwood leaf beetles (*chrysomela scripta*) and willow sawflies (*Janus abbreviatus*) cause growth loss by defoliating the trees. Trunk boring insects lower the value of the trees they attack. The yellow-bellied sapsucker (*Sphyrapicus varius*) pecks holes in the trunk, thus lowering the value of the attacked tree. Deer (*Odocoileus virginianus*), cattle, and hogs can cause serious damage to young trees by stripping the leaves and feeding on the tender shoots. Beavers (*Castor canadensis*) fell willows for food as well as for material for their homes and dams.

Characteristics and Properties

The wood of black willow may vary considerably in color, with the heartwood being pale reddish brown to grayish brown and the sapwood whitish tan to light tan. It has no characteristic odor or taste, and although moderately soft, it does not splinter when dented. Basswood (*Tilia* spp.), buckeye (*Aesculus* spp.), and cottonwood and aspen (*Populus* spp). are the only North American woods softer than black willow.

In cross section, the growth rings are rather indistinct and may vary from narrow to wide, depending on the growth rate of the tree. The wood, uniform in texture is semi-ring to diffuse-porous with the pores barely visible to the naked eye.

Black willow wood is very weak in bending stress and crushing strength. It is moderately high in shock resistance. Its nail-holding ability is low, but due to a somewhat interlocked grain it does not split readily. Shrinkage during seasoning is moderately large, and care must be exercised during the drying process to prevent warping. It has, however, excellent ability to stay in place once properly seasoned.

Black willow is classed as one of the most difficult woods to machine. It glues very well and readily accepts a number of finishes. The wood is not durable under conditions favorable to decay; it rates poorly, along with aspen, basswood, and cottonwood. Black willow is one of the lightest-weight North American hardwoods. It weighs about 27 pounds per cubic foot at 12-percent moisture content, and its specific gravity, based on green volume and ovendry weight, is 0.36. The value as a fuelwood is low.

Principal Uses

The primary uses of black willow are factory lumber, commercial and package veneer, box lumber, and pulpwood. Major users of willow lumber are the millwork and household furniture industries. Furniture uses include table tops, veneered pieces, core stock, frames, and other interior and exposed parts. Box lumber is used for framing shipping containers and pack-

ing cases, and package veneer is used in boxes and crates. Willow can also be used for solid paneling, interior trim, cabinetry, artificial limbs, fiber board, pulp and paper, slack cooperage, excelsior, and miscellaneous wooden items and novelties such as toys, cutting boards, picture frames, venetian blinds, wooden shoes, and polo balls. Freedom from checking and ease of working make willow a desirable wood for carving. Bees produce a high grade of honey from willow flowers.

Vast numbers of black willow poles have been used to make mats for bank stabilization along the major rivers. Black willow is also used in the basket industry in New England and elsewhere. During the early days of this country, the bark was used as a home remedy for fever ailments. In the early 1900's, black willows were planted as windbreaks and for protection from erosion.

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